

(21) Application No 9105160.7

(22) Date of filing 12.03.1991

(30) Priority data

(31) 02063767

(32) 14.03.1990

(33) JP

(71) Applicant

Kabushiki Kaisha Toshiba

(Incorporated in Japan)

72 Horikawa-cho, Saiwai-ku, Kawasaki-shi,
Kanagawa-ken, Japan

(72) Inventor

Masao Aono

(74) Agent and/or Address for Service

Marks & Clerk

57-60 Lincoln's Inn Fields, London, WC2A 3LS,
United Kingdom

(51) INT CL^{*}

F25C 5/16

(52) UK CL (Edition K)

F4H H2A H2G H2H H5Y

(56) Documents cited

GB 2167544 A

GB 2072822 A

GB 0847503 A

GB 0688458 A

GB 0847515 A

GB 0802329 A

EP 0248370 A2

(58) Field of search

UK CL (Edition K) F4H

INT CL^{*} F25C

Online databases: WPI

(54) Refrigerator with automatic ice maker

(57) A refrigerator with an ice maker (22) making ice (28) includes an ice reserving box (30) disposed in an ice reserving compartment (14) for receiving the ice (28) removed from the ice maker (22), a door (19) opening and closing an opening of the ice reserving compartment (14), the door (19) being drawably and a connector (34) for connecting the ice reserving box (30) to the door (19) of the ice reserving compartment (14) such that the ice reserving box (30) is drawn out to the outside of the ice reserving compartment (14) with the ice reserving compartment door (19) when the ice reserving compartment door (19) is drawn.

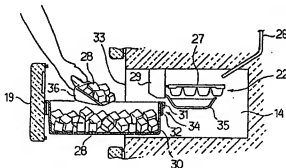


FIG.1

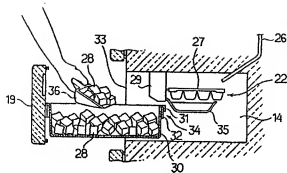


FIG. 1

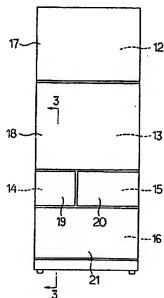


FIG. 2

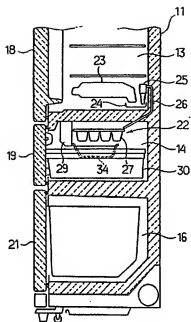


FIG. 3

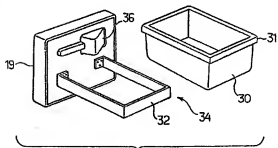


FIG. 4

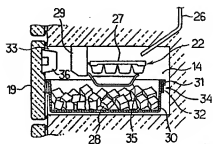


FIG. 5

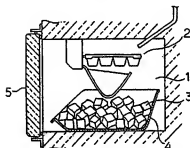


FIG. 6 (PRIOR ART)

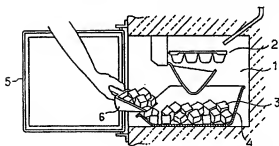


FIG. 7 (PRIOR ART)

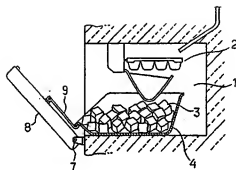


FIG. 8 (PRIOR ART)

REFRIGERATOR WITH AUTOMATIC ICE MAKER

This invention relates to a refrigerator equipped with an automatic ice maker automatically making ice cubes and then, removing the ice cubes therefrom, and more particularly to such a refrigerator equipped with such an automatic ice maker wherein the ice cubes removed from the ice maker can be reserved so as to be taken out.

Household refrigerators equipped with automatic ice makers have been conventionally proposed and commercially produced. FIG. 6 shows such an automatic ice maker 2 provided in an ice making and reserving compartment 1 of a refrigerator. An ice reserving box 4 is disposed below the ice maker 2 so that ice cubes 3 made by and removed from the same are reserved therein. Generally, there are two ways to take the ice cubes 3 out of the ice reserving box 4. In a first way, A door 5 of the ice making and reserving compartment 1 is opened and then, a user puts his or her hand on the front of the ice reserving box 4, drawing the same out. The user holds an equipped small shovel 6 in his or her hand and inserts the shovel 6 into the ice reserving box 4, scooping the ice cubes out of the ice reserving box 4. In a second way, opening the door 5 of the ice making and reserving compartment 1, the user holds the equipped shovel 6 and puts the same into the ice reserving box 4 positioned within the ice making and reserving box 1, scooping the ice cubes. See FIG. 7.

In accordance with the above-described first way, the ice reserving box 4 needs to be drawn out after the ice making and reserving compartment door 5 is opened, which is troublesome. On the other hand, since the ice reserving box 4 need not be drawn out in the second way, the user may be escaped from the troublesome drawing operation as described above. Although the second way would be desirable, the interior of the ice making and reserving compartment needs a sufficient space between the ice maker 2 and the ice reserving box 4, into which space the user's hand holding the shovel is inserted for scooping the ice cubes 3 and a space through which the user views the compartment inside in addition to the space for disposing the ice maker 2 and the ice reserving box 4. Thus, adoption of the second way renders the ice making and reserving compartment 1 large, which reduces the space for storage, freezing and other compartments of the refrigerator. Additionally, when the ice cubes 3 positioned in the front of the ice reserving box interior are taken out, the ice cubes are caused to go backward into the rear interior of the ice reserving box 4. It is troublesome for the user's hand to reach the rear interior of the ice reserving box 4. Consequently, the second way entails a problem that it is troublesome to take the ice cubes out of the ice reserving box.

25 The prior art has provided an improved construction as shown in FIG. 8. An ice making and reserving compartment door 8 is pivotally mounted on a hinge 7 so as to be opened

downward. The ice reserving box 4 is coupled to a member 9 mounted on the door 8 so that the ice reserving box 4 is drawn forward when the door 8 is opened. In this construction, the user need not draw the ice reserving box 4 every time the ice cubes are taken out. Furthermore, the ice reserving box 4 can be drawn more forwardly than in the above-described ways. Nevertheless, an amount of drawing of the ice reserving box 4 is small and accordingly, the easiness in taking out the ice cubes cannot be improved yet.

10 As described above, in the conventional refrigerator with the automatic ice maker, taking the ice cubes out of the ice reserving box is time consuming and the ice making and reserving compartment needs a large space, which reduces the space of the other compartments.

15 Therefore, an object of the present invention is to provide a refrigerator with an automatic ice maker wherein the ice cubes can be taken out of the ice reserving box easily without trouble and the interior of the ice making and reserving compartment can be prevented from being enlarged.

Another object of the invention is to provide a refrigerator with an automatic ice maker wherein the ice making can be performed efficiently.

Further another object of the invention is to provide a 25 refrigerator with an automatic ice maker wherein the ice cubes reserved in the ice reserving box can be easily scooped by a small shovel or the like.

The present invention provides a refrigerator with an ice maker for making ice and removing the ice therefrom, comprising an ice reserving box disposed in an ice reserving compartment for receiving the ice removed from the ice maker
5 and reserving the same, a door opening and closing an opening of the ice reserving compartment, the door being drawable, and connecting means for connecting the ice reserving box to the door of the ice reserving compartment such that the ice reserving box can be drawn out to the
10 outside of the ice reserving compartment with the ice reserving compartment door when the ice reserving compartment door is drawn.

In accordance with the refrigerator of the present invention, the ice reserving box can be drawn upon opening
15 of the ice reserving compartment door. Accordingly, the ice reserving box need not be drawn separately. When the ice reserving compartment door is opened, the ice reserving box is drawn to the outside of the compartment. The ice may be taken out of the ice reserving box at the outside of the ice
20 reserving compartment. Consequently, the ice reserving compartment interior does not need a large space. Furthermore, since the user can take out the ice from above the ice reserving box, the ice may be prevented from escaping inward of the ice reserving box. Additionally, the
25 user's hand can reach the inward of the ice reserving box.

It is preferable that the refrigerator further comprise a storage compartment disposed over the ice maker and a

water tank disposed in the storage compartment for supplying water to the ice maker. Since the water sufficiently cooled in the storage compartment can be supplied to the ice maker, the water can be made into ice quickly. Further, since the
5 storage compartment is disposed over the ice maker, gravity enhances the speed of the water supply to the ice maker. Consequently, the ice can be made more quickly.

It is preferable that the ice maker include a detection lever for detecting that an amount of ice reserved in the
10 ice reserving box has reached a limit amount. Thus, the making of ice over the limit amount may be avoided.

It is further preferable that a shovel be attached to the inside of the ice reserving compartment door for scooping the ice reserved in the ice reserving box.

15 The invention will be described, merely by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a longitudinal sectional side view of an ice reserving compartment of a refrigerator in accordance with
20 the present invention with an ice reserving box being drawn outward;

FIG. 2 is a front view of the refrigerator;

FIG. 3 is a longitudinal sectional side view taken along line 3-3 in FIG. 2;

25 FIG. 4 is an exploded perspective view of an ice reserving box and an ice reserving compartment door;

FIG. 5 is a longitudinal sectional side view of the ice

reserving compartment with the ice reserving box being enclosed in the compartment;

FIG. 6 is a view similar to FIG. 5 showing a prior art construction;

5 FIG. 7 is a view similar to FIG. 1 showing the prior art construction; and

FIG. 8 is a view similar to FIG. 1 showing another prior art construction.

One embodiment of the present invention will be
10 described with reference to the accompanying drawings. Referring first to FIGS. 2 and 3, a refrigerator cabinet 11 has therein an uppermost freezing compartment 12, a storage compartment 13, an ice making and reserving compartment 14 as an ice reserving compartment, another storage compartment
15 15 for storing raw fish and the like and a lowermost vegetable compartment 16. Doors 17 to 21 are provided for these compartments, respectively.

An automatic ice maker 22 is provided in the ice making and reserving compartment 14. Water reserved in a cartridge
20 type water tank 23 is supplied into an ice tray 27 through a water receiving pan 24, pump 25 and water supply hose 26. The water supplied into the ice tray 27 is made into ice under influence of a chilled air in the ice making and reserving compartment 14. Thereafter, the ice tray 27
25 containing the ice is inverted and slightly twisted by a drive section 29 comprising an electric motor, reduction gear mechanism and the like so that the ice is removed from

the ice tray 27, thereby obtaining ice cubes 28. The above-described operation is repeatedly performed.

Referring to FIG. 4, an ice reserving box 30 is disposed below the ice maker 22 in the ice making and reserving compartment 14 for receiving the ice cubes 28 removed from the ice tray 27. The ice reserving box 30 is formed into a generally rectangular box and has a flange 31 along the upper peripheral edge.

The ice making and reserving compartment door 19 has an integrally formed rectangular support frame 32 on the back thereof. The door 19 is guided by guide rails (not shown) and guide rollers (not shown) provided on both sides of the bottom of the ice making and reserving compartment 14 so that the door 19 is drawn for opening and closing an opening of the ice making and reserving compartment 14. The ice reserving box 30 is disposed from above the support frame 32 so that the flange 31 thereof rests on the support frame 32 as shown in FIG. 3, whereby the ice reserving box 30 is detachably connected to the door 19. In the state that the ice reserving box 30 is connected to the door 19, the box 30 is drawn out of the ice making and reserving compartment 14 when the door 19 is opened. Thus, connecting means 34 for connecting the ice reserving box 30 to the door 19 is comprised of the support frame 32 and the ice reserving box flange 31.

A detection lever 35 is extended from the ice maker 22 so as to be positioned in the ice reserving box 30 disposed

in the ice making and reserving compartment 14. The detection lever 35 is adapted to detect an amount of ice cubes 28 reserved in the ice reserving box 30. When a limit amount of the ice cubes 28 is detected by the detection lever 35, the ice making operation is stopped. A small shovel 36 for scooping the ice cubes 28 reserved in the ice reserving box 30 is detachably attached to the back of the door 19.

The operation of the refrigerator thus constructed will be described. When the ice cubes 28 reserved in the ice reserving box 30, the user lays his or her hand on the door 19 in the state that the ice reserving box 30 is disposed in the ice making and reserving compartment 14 and draws the door 19 toward his or her side such that the door 19 is forward moved away from the opening 33 of the ice making and reserving compartment 14. With this forward movement of the door 19, the ice reserving box 30 held by the support frame 32 is drawn forward. Subsequently, the shovel 36 is detached from the door 19 and inserted into the ice reserving box 30, scooping the ice cubes 28, as shown in FIG. 1.

In accordance with the above-described construction, the ice reserving box 30 can be drawn upon opening of the door 19. Since the operation of drawing the ice reserving box 30 separately is not needed, the trouble may be eliminated. Furthermore, since the ice reserving box 30 is drawn to the outside of the ice making and reserving

compartment 14, the user does not need to put his or her hand into the space between the ice maker 22 and the ice reserving box 30. Accordingly, the space into which the user's hand is put and the space through which the user
5 views the inside of the ice reserving box 30 are not necessary. Consequently, the interior of the ice making and reserving compartment 14 can be reduced, which secures a sufficient space for the other refrigerator compartments. Furthermore, since the ice cubes 28 can be scooped by the
10 shovel 36 from above the ice reserving box 30, the ice cubes 28 may be prevented from escaping inward of the ice reserving box 30. Additionally, the user's hand can be readily put into the inward of the ice reserving box 30. Thus, the ice cubes 28 may be easily scooped.

15 Since the ice maker 22 is supplied with water from the water tank 23 disposed in the storage compartment 13, the water is cooled in the storage compartment 13. Consequently, the water may be made into ice quickly. Furthermore, since the storage compartment 13 is disposed
20 above the automatic ice maker 22, gravity enhances the water supply to the ice maker 22. Consequently, the ice making may be made more quickly. Furthermore, since the detection lever is provided for detecting reach of a limit amount of the ice cubes 28 reserved in the ice reserving box 30.
25 Thus, the making of ice over the limit amount may be avoided. Consequently, the ice cubes may efficiently be made. Additionally, since the refrigerator is provided with

the shovel 36 for scooping the ice cubes, the ice cubes may be scooped with ease. Consequently, the refrigerator handling may be improved.

Although both of the ice reserving box 30 and automatic
5 ice maker 22 are provided in the ice making and reserving compartment 14 in the foregoing embodiment, only the ice reserving box 30 may be disposed in the ice making and reserving compartment 14 and the automatic ice maker 22 may be separately provided. In this case, the ice cubes 28 are
10 guided into the ice reserving box 30 by a suitable guide member or members. Furthermore, another type of the ice maker may be employed, for example, the ice maker of the plate type.

The foregoing disclosure and drawings are merely
15 illustrative of the principles of the present invention and are not to be interpreted in a limiting sense. The only limitation is to be determined from the scope of the appended claims.

WE CLAIM:

1. A refrigerator with an ice maker for making ice and removing the ice therefrom, comprising an ice reserving box disposed in an ice reserving compartment for receiving the ice removed from the ice maker and reserving the same, a
5 door opening and closing an opening of the ice reserving compartment, the door being drawable, and connecting means for connecting the ice reserving box to the door of the ice reserving compartment such that the ice reserving box can be drawn out to the outside of the ice reserving compartment
10 with the ice reserving compartment door when the ice reserving compartment door is drawn.

2. A refrigerator according to claim 1, further comprising a storage compartment disposed over the ice maker and a water tank disposed in the storage compartment for
15 supplying water to the ice maker.

3. A refrigerator according to claim 1, wherein the ice maker includes a detection lever for detecting that an amount of ice reserved in the ice reserving box has reached a limit amount.

20 4. A refrigerator according to claim 1, further comprising a shovel attached to the inside of the ice reserving compartment door for scooping the ice reserved in

the ice reserving box.

5. A refrigerator with an ice maker substantially as described herein with reference to the accompanying drawings.